Run-time Modifications

Mods

Run-time Modifications

Interaction between the forecaster and OFS is needed because:

- Models used to simulate water movement are not perfect
- Calibration parameters are not perfect
- Rainfall, streamflow, and other input data are not perfect

Run-time Modifications

Overview

- Uses
  - ▸ Improve the forecast
  - ▸ Maintain state variables

- Run-time modifications (mods) were available in OFS from the beginning.
  - ▸ Not used much in mainframe days - turnaround time too long
  - ▸ Have begun to get a lot of use in the local processing environment - especially in IFP.

Run-time Modifications

Overview (cont.)

- Mods are mechanism by which the forecaster can interact with FCEXEC function to:
    - ▸ Modify time series data
    - ▸ Change model computations and state variables
    - ▸ Override model output
    - ▸ Change parameter values (some selected cases)

Run-time Modifications

Overview (cont.)

- Most mods are temporary
  - ▸ If removed, results revert back to original values
  - ▸ Effect of mods on state variables are only saved when carryover is saved
  - ▸ Will become "permanent" when reflected in oldest date of carryover on file -mod can safely be removed at that time
- Few selected mods are permanent
  - ▸ Force changes to be written to parametric database
  - ▸ Effect will remain if mod is removed

Run-time Modificatons

Overview (cont).

- Most mods have one or more dates associated with them
  - ▸ Start of mod, end of mod, valid date
- Mod information found in Users Manual Section VI.5.3C-FCEXEC-MOD
  - ▸ Overview
  - ▸ General formats
  - ▸ Summary chart
  - ▸ Details on each mod

Run-time Modifications

Tools Available to Help Make Mods

- Spatial and temporal variablility of precipitation
  - ▸ Stage III/MPE, xnav, nmap, Mountain Mapper
- Operations table, parameters, initial state variables for carry over date
  - ▸ IFP
- Meteorological information on form of precipitation, wind, dew point, sky conditions, etc.
  - ▸ D2D

Run-time Modifications

Tools Available to Help Make Mods (cont.)

- Time series displayed in PLOT-TUL operations
  - ▸ Batch OFS, IFP
- NOHRSC data on areal extent of snow cover and water equivalent
- Information on special conditions from coop observers
  - ▸ Ice jams, frozen ground, etc.
- Others ...

Run-time Modifications

Use in FCEXEC

- Goals
  - ▸ Model results replicate observations
    - – within limits of reliability
  - ▸ Model results reflect what will happen in the future
    - – Most important

Run-time Modifications

Use in FCEXEC - Game playing methods

- Based on sound hydrology and ability to assess what is taking place.
  - ▶ Requires:
    - Properly calibrated models
    - Operational data that is unbiased compared to calibration data
    - Knowledge of models including their limitations
    - Tools to view data, see model output, how states are changing, etc. to determine where adjustments need to be made
  - ▶ Changes are made so model states better represent reality
  - ▶ Reduces the number of adjustments needed later

Run-time Modifications

Use in FCEXEC - Game playing methods (cont.)

- Based on years of forecasting experience
  - May have:
    - Models that are not properly calibrated
    - Bias between operational data and calibration data
    - Limited knowledge of the models
    - Limited tools to view data, see model output, how states are changing, etc.
  - Changes are made based on forecaster experience on what river did in the past
  - Changes made to model output so model states not updated
  - Increases chance of more adjustments being needed in future

Run-time Modifications

Use in FCEXEC - Game playing methods (cont.)

- Based on luck
  - ▸ May have:
    - – Limited knowledge of the models
    - – Limited experience
  - ▸ Changes are made by trial and error
  - ▸ Uses goal of matching simulation to observations and hopes the future is OK
  - ▸ Increases chance of more adjustments being needed in future
- Reality is some combination of these methods - should strive for first method!

Run-time Modifications

Rules for Applying Mods

- Multiple Mods
  - Same time interval
    - Value being replaced
      - Only one value applied per time interval - last in wins
    - Value being multiplied
      - All values are applied - values are multiplied together
    - Values being added
      - All values are applied - values are added together
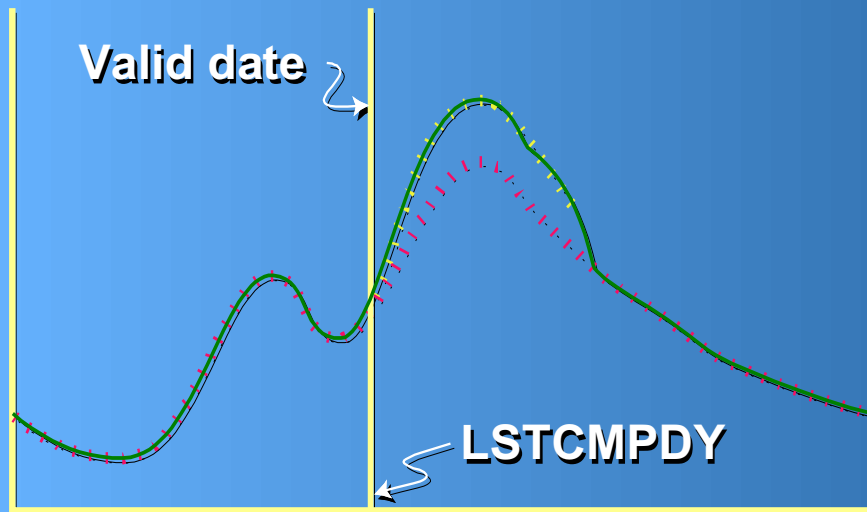
Run-time Modifications

- Multiple mods (continued)
  - Explicitly specified
    - Mods that affect operations or rating curves generally apply to all operations or rating curves in the segment unless explicitly specified on the mod card with /opname where opname is the operation name
  - General
    - If all else the same - last in wins
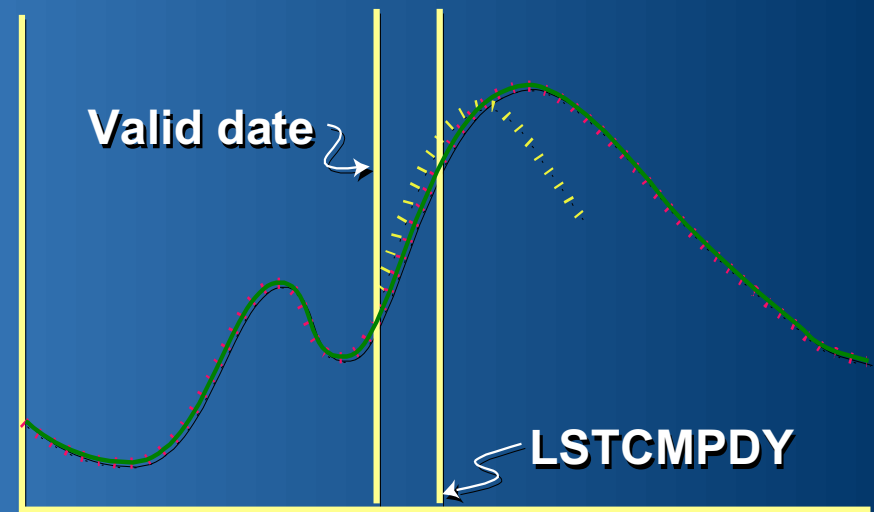
Run-time Modifications

Rules for Applying Mods (cont.)

- Mods that use the Valid date field
  - ▶ In general, changes made to future values only valid at the time of the forecast
  - ▶ Forecasted changes should not override values based on observations at a subsequent time
  - ▶ Valid date field used to specifiy what time changes to future values were made
  - ▶ Changes to future values will only apply when LSTCMPDY=Valid date
- Mods that overlap run period
  - ▶ Only the part of the mod within the run period is used
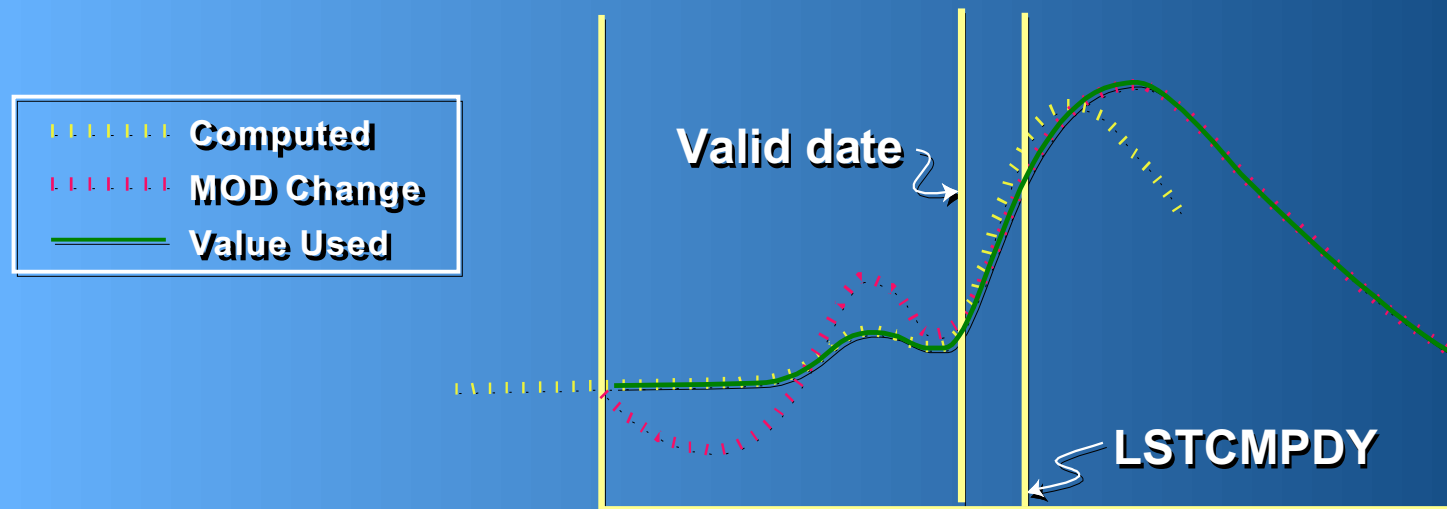
MODS and the Valid Date Field

A. Valid Date Equals LSTCMPDY

B. Valid Date Less Than LSTCMPDY

C. Valid Date Used With Values That Overlap the Run Period

Run-time Modifications

Mods Syntax

- .COMMAND
  - ▸ COMMAND is the name of the mod
  - ▸ The . must be in column 1

- Free format

- Syntax of individual mods in section VI.5.3C-FCEXEC-MOD

- Date may be required
  - ▸ Start of mod, end of mod, valid date
  - ▸ All date formats are allowed except *

- Must use '&' as continuation symbol for lines longer than 72 characters